Meningococcal Infection, Invasive
(Neisseria meningitidis)

(Including Meningitis, Meningococcemia, Pneumonia and Other Invasive Infections)

Report Immediately

March 2003

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Invasive meningococcal infections are caused by the bacterium *Neisseria meningitidis* (the meningococcus), a gram-negative diplococcus. There are 13 serogroups (A, B, C, D, 29E, H, I, K, L, W-135, X, Y, and Z) of *N. meningitidis*, classified according to the immunologic reactivity of their polysaccharide capsules. Serogroups B, C, and Y each account for approximately 30% of reported cases in United States in recent years. Serogroup W-135 accounts for 2-4%, and 4-6% of strains are nongroupable.

B. Clinical Description and Laboratory Diagnosis

Invasive infection with *N. meningitidis* may cause several clinical syndromes, including meningitis, bacteremia, sepsis or pneumonia. Symptoms of **meningitis** (infection of the meninges, the membrane covering the central nervous system) typically include the sudden onset of a stiff neck, high fever and headache. A petechial rash may be present. Nausea, vomiting and mental confusion are often also present. **Meningococcemia** (infection of the blood) typically presents with the abrupt onset of fever, chills, malaise, prostration and rash (urticarial, maculopapular, purpuric or petechial). Fulminant cases present with purpura, disseminated intravascular coagulation, shock, and/or coma and may lead to death within hours despite appropriate therapy. Meningococcal diseases case-fatality ratios remain high, 10-15% (3% for meningococcal meningitis and 17% for meningococcemia) even with appropriate antibiotic treatment. Increasing age, having an isolate obtained from blood, and serogroup C are associated with increased case fatality. Nearly one-fifth of survivors experience debilitating sequelae, including hearing or visual loss, learning disabilities or mental retardation, seizures, and amputation of limbs.

Laboratory diagnosis is based on recovery of meningococci from the cerebrospinal fluid (CSF) or blood. In culture negative cases, the diagnosis may be supported by identification of group specific meningococcal polysaccharides in CSF by latex agglutination (LA), counterimmunoelectrophoresis (CIE) and coagglutination techniques, or meningococcal DNA in CSF or plasma by polymerase chain reaction (PCR).

C. Reservoirs

Humans are the only known reservoir of *N. meningitidis.*

D. Modes of Transmission

Five to 10% of adults are asymptomatic nasopharyngeal carriers of strains of *N. meningitidis*, most of which are not pathogenic. The principal route of meningococcal transmission is person-to-person, via aerosolized respiratory droplets or oral secretions from an asymptomatic carriers or individuals with invasive disease. The bacteria may also be spread by an inanimate vehicle contaminated with saliva (*e.g.*, a cigarette, food utensils or water bottle).

E. Incubation Period

The incubation period can vary from 1 to 10 days, usually 2–4 days.

F. Period of Communicability or Infectious Period

Cases remain infectious as long as meningococci are present in oral secretions or until 24 hours after initiation of effective antibiotic treatment.

G. Epidemiology

Sporadic cases and occasional outbreaks of invasive meningococcal disease occur worldwide. An endemic "meningitis belt" area extends from sub-Saharan Africa into India/Nepal due to serogroup A menigococcal infections. Epidemics of meningococcal meningitis also occur in this meningitis belt every 8 to 12 years, usually in dry, hot seasons.

In the United States, the rate of invasive disease is 1 per 100,000 population, with 2,500 cases and 400 deaths projected per year. The largest number of cases of invasive meningococcal disease usually occurs during the winter and early spring, coincident with an increase in the occurrence of acute respiratory infections. More than half of invasive infections occur in children younger than 5 (5/100,000 population per year). A second incidence peak (1.5-2/100,000 population per year) is often observed among people aged 15 to 24. Outbreaks of invasive meningococcal disease occur most frequently in crowded conditions (*i.e.*, military bases, college dormitories). In New Jersey, approximately 65 cases of invasive meningococcal disease are reported every year to the NJDHSS.

Meningococcal carriage*: N. meningitidis* typically colonizes the nose and throat of 5-10% of the general population at any given time. These carriers are generally asymptomatic, and carriage of the bacteria may act as an immunizing exposure, protecting the carrier from future infections by that particular strain. Carriers act as vectors, spreading the bacteria to others through saliva and respiratory secretions.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

CASE CLASSIFICATION

A. CONFIRMED

A clinically compatible case, **AND**

- Isolation of *N. meningitidis* from a normally sterile site, such as blood, cerebrospinal, joint, pleural, or pericardial fluid (Isolates obtained from sputum or throat cultures **are not considered** an indication of invasive disease)

B. PROBABLE

A clinically compatible case, **AND**

- Gram-negative diplococci observed in CSF or blood, **OR**
- Positive antigen test **in CSF** (antigen detection in urine or serum **does not** support the diagnosis), **OR**
- Clinical purpura fulminans.

NOTE: Isolates of *N. meningitidis* must be submitted within the three (3) working days to the New Jersey Department of Health and Senior Services, Division of Public Health and Environmental Laboratories, Specimen Receiving and Records , P.O. Box 361, John Fitch Plaza, Trenton, NJ 08625-0361.

B. Laboratory Testing Services Available

The Public Health and Environmental Laboratories (PHEL) request that all laboratories submit *all* isolates *N. meningitidis* cultured for typing to aid in public health surveillance. For more information contact the PHEL at 609.292.7368. The PHEL will confirm and serogroup isolates of *N. meningitidis.* This serogrouping aids in public health surveillance. For more information on submitting specimens, contact the PHEL at 609.292.4061.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify close contacts of a case and provide recommendations for appropriate preventive measures for those close contacts, and thus prevent further spread of infection.
- To provide information about the disease, its transmission, and methods of prevention.
- To promptly identify clusters or outbreaks of disease and initiate appropriate prevention and control measures.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories **immediately report** (by telephone, confidential fax, over the Internet using the Communicable Disease Reporting System (CDRS)) any suspect or known case of invasive meningococcal to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.
If this is not possible, call the Infectious and Zoonotic Diseases Program NJDHSS at 609.588.7500 during business hours, 609.392.2020, after business hours, on weekends and holidays. Such report shall be followed by a written or electronic report within 24 hours of the initial report

C. Health Officer Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**
The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that each local health officer must report **immediately** the occurrence of any case of invasive meningococcal infection, as defined by the reporting criteria in Section 2A above. A telephone report shall be followed up by a written or electronic report within 24 hours of the initial report or the report can be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS).

2. **Case Investigation**
   a. **The most important step a local health officer can take if he/she learns of any case of invasive meningococcal infection is to call the NJDHSS immediately, any time of the day or night. The daytime phone number of the Infectious and Zoonotic Program NJDHSS is 609.588.7500. The emergency phone number for nights and weekends is 609.392.2020.**
   b. After notification to the IZDP, it is the health officer's responsibility to complete a CDS-1 form by interviewing the patient and/or others who may be able to provide pertinent information.
   c. The first step to following up a case of invasive meningococcal infection is to confirm the diagnosis. Often, reported cases of "meningitis" are ultimately found to be caused by bacteria other than *N. meningitidis* or by a virus.
   d. Use the following guidelines assisting in completing the CDS-1 form :

1) Accurately record the demographic information, collecting as much case information as possible, including address, place of work, occupation, and daycare or school information.
2) If the patient is hospitalized, collect hospital and transfer hospital information if applicable. Hospital laboratories and infection control practitioners are key in obtaining the appropriate information for confirming a diagnosis.
3) Collect clinical information on the patient including date of symptom onset, symptoms, laboratory data, treatment information, and outcome of disease (*e.g*., recovered, died). This information is best collected from the infection control practitioner at the hospital or the patient's healthcare provider.
4) Collect as much information as possible about the patient's activities and contacts during the 2 weeks prior to the onset of illness. This information may be obtained from the patient, the patient's family and friends, school or daycare personnel, or others involved with the patient. Those who meet the definition of a close contact (see Section 4B below) of a case of invasive meningococcal disease must be referred to their healthcare providers for appropriate antibiotic therapy. Sample letters for notifying contacts in a school.
5) If there have been several unsuccessful attempts to obtain patient information (*e.g.*, the patient or healthcare provider does not return calls or does not respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter collected information into "Comments" section.**

After completing the form, attach all lab report(s) and fax to the NJDHSS Infectious and Zoonotic Diseases Program, or the report can be filed electronically over the Internet using the confidential and secure Communicable Disease Reporting System (CDRS). The confidential fax number is 609.588.3894. Call the IZDP at 609.588.7500 to confirm receipt of the fax. The mailing address is:

NJDHSS
Division of Epidemiology, Environmental and Occupational Health
Infectious and Zoonotic Diseases Program,
P.O. Box 369,
Trenton, NJ 08625-0369

e. If an air passenger with potential meningococcal disease is involved, notify **immediately** the IZDP at 609.588.7500 (weekdays), or 609.392.2020 (nights/weekends). IZDP staff is responsible for notifying the CDC quarantine station with jurisdiction over the port of entry for obtaining the passenger manifest. State or local health departments in the patient's area of residence should be responsible for contacting each exposed traveler. The CDC quarantine station can assist in notifying a foreign national temporarily visiting the United States, or the passenger's home country.

f. Institution of disease control measures is an integral part of case investigation. It is the health officer's responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4 "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.10)

Minimum Period of Isolation of Patient
Until 24 hours after the initiation of appropriate antibiotic therapy.

Minimum Period of Quarantine of Contacts
Personal surveillance and antibiotic prophylaxis, where appropriate.

B. Protection of Contacts of a Case

Prophylaxis: Close contacts of the patient should be identified and referred to their healthcare provider for antibiotic prophylaxis. A **close contact** is defined as any members of the patient's household or other individuals who had intimate contact with the patient's saliva or oral/nasal secretions. Healthcare workers who have intimate contact with the patient's oral/nasal secretions (through unprotected mouth-to-mouth resuscitation, intubation, or suctioning) are also considered close contacts.

Recommended Chemoprophylaxis Regimens for High-Risk Contacts and Index Cases of Invasive Meningococcal Diseases	
Antibiotic/Age Group	**Dosage/Schedule**
Rifampin*	
<= 1 mo	5 mg/kg orally every 12 h for 2 days
> 1 mo	10 mg/kg (max. 600 mg) orally every 12 h for 2 days
Ceftriaxone	
<= 12 y	125mg intramuscularly, single dose
> 12y	250 mg intramuscularly, single dose
Ciprofloxacin*	
>= 18 y	500 mg orally, single dose

C. Managing Special Situations

Daycare and School
A case of invasive meningococcal illness in a daycare setting or a school often causes panic among parents and the community. Although the risk of transmission in this setting remains relatively low, chemoprophylaxis for all the children in the daycare class or the daycare facility may be recommended because the physical interactions between young children are often very close. For the same reason, chemoprophylaxis for all the children in the patient's class may be recommended if the child is in early elementary school. A high school or college student, on the other hand, usually has a more defined group of close contacts and chemoprophylaxis may be more targeted. Surveillance for additional cases of disease should also be heightened. Contact the IZDP to report suspect, probable or confirmed cases in a daycare or school. An epidemiologist will work with you to ensure all contacts are identified and notified. In addition, surveillance for new cases of disease should continue at the facility for at least 2 weeks after the onset of the first case. If multiple cases occur, surveillance should continue for 2 weeks after the onset of the last case.

Community Residential Program
If a case of meningococcal disease occurs in a residential program, close contacts of the patient should be referred to their healthcare provider for chemoprophylaxis. The activity in the facility should be assessed to determine the level of interaction between residents. The facility may be considered a household setting and require chemoprophylaxis of all residents, or the chemoprophylaxis may be more targeted. Contact the IZDP for assistance in following up a case of invasive meningococcal disease in residential programs. In addition, surveillance for new cases of disease in the facility should continue for at least 2 weeks after the onset of the first case. If multiple cases occur, surveillance should continue for 2 weeks after the onset of the last case.

Aircrafts
Commercial aircraft are suitable environments for the spread of *N. meningitides.* A case of air-travel –associated meningococcal disease is defined as a patient who meets the case definition of meningococcal diseases within 14 days of travel on a flight of at least 8 hours duration (including ground time). Passengers seated directly next to the index case are recommended to receive chemoprophylaxis.

Reported Incidence Is Higher than Usual/Outbreak Suspected
If the number of reported cases in a city/town is higher than usual for the time of year, or if an outbreak, is suspected please immediately contact the IZDP at 609.588.7500. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases. The Program staff can perform surveillance for clusters of illness that may cross several jurisdictions and therefore be difficult to identify at a local level.

D. Preventive Measures

Personal Preventive Measures/Education
To prevent additional cases:

- Refer close contacts to healthcare providers for appropriate chemoprophylaxis.
- Advise contacts of signs and symptoms of illness and refer them to their healthcare provider should they experience any symptoms compatible with invasive meningococcal disease.
- Provide close contacts with a *Meningococcal Meningitis Fact Sheet* available from the NJDHSS website.

To avoid future exposures advise individuals to:

- Practice good hygiene and handwashing.
- Avoid sharing food, beverages, cigarettes or eating utensils.
- Consider immunization in certain circumstances (see below).

Immunization
A vaccine protecting against four serogroups (A, C, Y, and W-135) of *N. meningitidis* is available. The vaccine is not recommended for routine use, but is recommended for travelers to endemic countries, certain high-risk individuals, and in the case of an outbreak of invasive disease (as defined by the Advisory Committee on Immunization Practices [ACIP]). On October 20, 1999, the ACIP modified its recommendations for the use of meningococcal vaccine in college students. The ACIP recommends that healthcare providers of college students provide information to students and their parents about meningococcal disease and the benefits of vaccination. In particular, vaccination should be made easily available to freshman students. The NJDHSS strongly encourages students and their parents to talk with their healthcare providers about the meningococcal vaccine and the specific circumstances of the student.

Although routine administration of meningococcal vaccine to all college students is not currently recommended, meningococcal vaccine may be appropriate for certain students depending on their living conditions and behavioral exposure risks. Meningococcal disease is spread through direct contact with oral or nasal secretions of a carrier. A closed setting such as a college dormitory, combined with high-risk behaviors in college students (alcohol consumption, exposure to tobacco smoke, sharing food or beverages, activities involving the exchange of saliva, etc.), may cause some college students to be at greater risk for invasive infection. Healthcare providers should discuss these risk factors and the likelihood that their patients will be involved in high-risk behaviors when evaluating patients for the administration of meningococcal vaccine.

ADDITIONAL INFORMATION

A *Meningococcal Meningitis Fact Sheet* can be obtained at the NJDHSS website at www.state.nj.us/health.

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for invasive meningococcal infection is the same as the criteria outlined in Section 2A of this chapter. CDC case definitions are used by state health departments and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always refer to Section 2A.

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